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AGRICULTURAL NEWS LETTER

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This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations of the du Pont Company and its subsidiary companies. It also contains published reports and direct contributions of investigators of agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

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FOOD INDUSTRY, FROM SEED TO PACKAGED ARMY RATIONS, AIDED BY CHEMISTRY

The contributions of chemical science to the production and handling of food are second in importance only to those of agriculture itself.

From the soil of the farm to the compressed dehydrated food tablet in the pocket of a soldier in a fox-hole, chemistry performs vital services in the growing, processing and packaging of food for war.

Food and Fiber Crops Protected with Seed Disinfectants

There's many a slip twixt the seed and the lip, and at the very start chemistry enters the picture with seed disinfectants to protect against certain plant diseases. It is estimated that a quarter of all the food and fiber crops in the United States are so protected. Some bacterial enemies cause the seed to rot before it germinates. Others attack the sprouting seed and others produce "damping-off" just after the seedling has pushed up through the ground. Watering the young plants with a disinfectant solution is another check against these early enemies.

Million of Tons of Fertilizers Used Annually

To maintain the fertility of the soil and to increase crop yields, approximately nine million tons of commercial fertilizer are used in this country each year. Much of this contains nitrogen drawn out of the air and fixed by the chemical industry's high-pressure plants, as well as superphosphate prepared by treating phosphate rock with sulfuric acid, a staple product of chemistry.

Other Chemical Crop Aids Include Sprays and Dusts

Other chemical aids to the growing crops are sprays and dusts to check the ravages of insects and fungi, which cause an estimated annual crop loss of more than a half billion dollars, and new plant hormones to improve the root growth of seedlings. Du Pont's "Parmone" pre-harvest fruit-drop spray helps keep fruit from falling off the branches just prior to harvest.

Less Familiar Contributions of Chemistry

These are illustrations of chemistry's direct help to the farmer; but less familiar, though no less important, are a variety of contributions which industrial chemistry makes farther along the line from the farm to the table.

Consider the baking of bread, which is the most universal item in the world's diet. It requires yeast, but not just any old yeast. So-called "wild yeasts" that may be floating around cause "off" flavors in the bread. Therefore the bakers want "pedigreed" yeasts that have been reared under careful, controlled conditions. The culture medium on which these yeasts are grown can

Continued on next page

be enriched by chemical nutrients. One of these is pure-white crystalline carbamide, or synthetic urea, made in a high-pressure plant from coal, air and water.

Chemicals Delay Growth of Unwanted Molds

While the chemist aids nature on the one hand by nourishing the little yeast plants, he checks her at another point by delaying the growth of unwanted organisms, such as the molds that flourish on bread in warm humid weather. Approximately three billion loaves of bread for civilians and soldiers will be protected this year against mold and against a microbial growth known as "rope", by the addition of "Mycoban" propionate salts.

These products, manufactured by chemical means, are the same as those which occur as a natural ingredient in certain foods, such as vinegar, Swiss cheese and certain other milk-derived products. Two or three ounces added to the dough for 150 loaves will delay development of mold several days, allowing ample time for delivery and consumption of the bread. It in no way affects taste, texture or appearance. "Mycoban" is also used to inhibit mold growth in pies, cakes and butter. In the case of butter the inhibitor is incorporated into the wrappers and thus protects the surface of the butter, where the mold usually flourishes.

Molds Are Not Always Bad Actors

There is the black fellow, Aspergillus niger, which is sometimes found on the surface of jelly. He isn't wanted there, but he is a valued little manufacturing chemist when given the right material to work with. For A. niger has the power to convert sugar solutions into citric acid, which is widely used in flavoring extracts, soft drinks and candies.

Just as synthetic urea is used to feed the baker's yeast, so it is employed to enrich the food of the Aspergillus mold in the citric acid fermentation plants. In one process the molds are grown on the surface of the corn sugar solution, to which the chemical nutrient has been added. More than 20,000,000 pounds of citric acid are normally produced in this country each year by the mold fermentation method.

Lactic Acid Widely Used In Food Industry

Lactic acid is used in packing olives, where it retards molding and it imparts a tart flavor to many food products, including pickles, salad dressing, jams, jellies, candies, fruit ices and soft drinks. Lactic acid, too, is produced by a group of microscopic chemists, the beneficial lactic acid bacteria. They occur in milk, which is soured by the lactic acid they form. But in the commercial production of this important food ingredient by the Du Pont Company and others, the bacteria are put to work on other forms of carbohydrates, which they convert into the acid. Considerable amounts of phosphates are used in the manufacture of processed cheese.

Continued on next page

Vitamins By the Ton

Vitamins by the ton are being produced by the chemical industry, for fortification of foods and for administering in capsule form. Even the chickens are getting their share, for vitamin D is necessary for the prevention of rickets in young chicks and for insuring satisfactory egg yields and desirable hatching qualities in the eggs. "Delsterol" "D"-activated animal sterol is widely used in the poultry field as a source of vitamin D, and is contributing, therefore, to the production of the record 57 billion eggs and the four billion pounds of chicken meat which the government wants from American farms this year to feed us and our allies.

Chemical Industry Contributes In Countless Other Ways

Certain dyes which are selected by the Pure Food and Drug Administration as being perfectly harmless to the system are used to color butter, candies, gelatine, etc. And synthetic flavorings are now in unusual demand because of the shortage of imported natural flavoring extracts. Among the most important of these are coumarin, which has a vanilla flavor, and methyl anthranilate, which tastes like grapes. Alcohol manufactured by the chemical industry from apples and other fruit is employed in the recovery of pectin, for jelly making and for medicinal use.

Special alkaline cleaning agents with long names make short work of washing the equipment and utensils used in the food processing industries. Among these are trisodium phosphate, metasilicate of soda and tetra-sodium-pyrophosphate. The Army uses quantities of these products in its dish-washing machines and to clean walls and floors of kitchens and barracks. Other chemicals are employed to sterilize equipment and to insure that the food products go out free from bacterial or other contamination.

Conserving the food until it is served at the table is obviously a big part of the food industry's job, and here again chemistry contributes. Many tons of ammonia, made by high-pressure synthesis out of the nitrogen of the air and the hydrogen of water, are used each year to manufacture ice as well as to create the low temperatures for quick-freezing foods and for holding foods in cold storage. Quick freezing is achieved by a variety of methods, including blasts of cold air, contact with cold plates, and dips or sprays of brine or sugar solution.

Another chemical product, Du Pont's "Freon" fluorinated refrigerant, which is odorless, non-toxic and non-flammable, is widely employed in the delivery and grocery store retailing of the quick-frozen foods. "Freon" is also used in many household refrigerators and in rural and suburban frozen food lockers, as well as in air-conditioning systems, including those which keep the air of food processing plants clean and comfortably cool. "Freon" is the refrigerant which keeps the food fresh on many of the ships of the American Navy and Maritime Service.

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Packaging of Food Is Chemical Problem

Finally, the packaging of food products has become a chemical problem, of particular importance in view of the war-time shortage of metals. Paper impregnated with various greaseproof materials, including Du Pont's sodium silicate and polyvinyl alcohol, is being employed here. Large quantities of sodium silicate adhesive are also used in the fabricating of boxboard. And cellophane has during the past year extended its usefulness into many new areas of the food field, where it has been a standard wrapping material for many years. By itself or combined with paperboard, cellophane is replacing metal cans in the packaging of shortening, frozen eggs, baking powder and other things. Its biggest job is in the protection of dehydrated foods, and, more recently, compressed dehydrated foods, for shipment on Lend-Lease and for field rations for the Army.

As a postscript, the water in which food is cooked is made pure by chemical treatment. Alum is employed to clarify water, and as an aid to filtering. Chlorine, or a combination of chlorine and ammonia, is used to kill bacteria.

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HATCHABILITY OF EGGS NEARLY DOUBLED

With the government demanding 57,360,000,000 eggs and 4,000,000,000 pounds of poultry meat this year, the increased fertility and hatchability reported by two New England poultrymen is considered a valuable contribution to the food-for-victory program.

These men, Wayland and Gordon Charter, attribute the decided increases in the last few years by their older hens to use of high-quality feed containing adequate amounts of "Delsterol" "D"-activated animal sterol.

"The hatchability of the eggs from these hens averaged only between 40 and 50 per cent at certain seasons of the year," reported the brothers, who own a sizeable poultry breeding farm at Stafford Springs, Conn. "Today 80 per cent hatchability is not uncommon."

For more than two years the feed they used has been fortified with "Delsterol" to provide vitamin D, the all-important ingredient that prevents rickets and promotes health and growth of poultry. The brothers report that egg-shell texture is also much improved.

These conclusions are of importance not only in terms of more food but because they mean more profit for the grower. In 1942, the income of American poultry and turkey raisers totaled $1,951,350,000. According to reliable estimates it will exceed two billions in 1943.

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PHENOTHIAZINE-SODIUM FLUOSILICATE MIXTURE KILLS CATTLE LICE IN TEST

A new combination of two chemical compounds, diluted with ordinary wheat flour, has been used successfully to destroy both chewing and sucking lice that infest cattle.

The mixture, made up of two parts sodium fluosilicate, one part phenothiazine, and one part white flour, gave complete control in experiments conducted by H. S. Telford, J. H. Longwell, and J. A. Munro at the North Dakota Agricultural Experiment Station, Fargo.

"In view of the limited supplies of rotenone and pyrethrum, both effective louse powders, this phenothiazine dusting mixture may replace these imported insecticides," these North Dakota scientists state.

Phenothiazine Alone Kills Sucking Lice

In the tests, phenothiazine alone, merely diluted with equal parts of flour, in trials on 12 infested animals located in various parts of the state, resulted in a 100% kill of both short-nosed and long-nosed sucking lice in every trial. However, it failed to kill chewing lice. Twelve hours after the mixture was applied to two heavily infested bulls, the chewing lice had discontinued feeding and were scattered throughout the hair. When the animals were examined the next day, however, the lice had moved to the skin and were actively feeding.

When the sodium fluosilicate was added to the diluted phenothiazine, it killed both chewing and sucking lice.

Further Experiments Underway at North Dakota Station

"It is entirely possible that effective control may be achieved by increasing the diluent and decreasing the amount of phenothiazine or sodium fluosilicate," according to the North Dakota experimenters. "This phase of experimentation is now under way at the North Dakota Station."

In other tests conducted at the government's experiment station at Menard, Texas, phenothiazine alone, dusted on chickens infested with head, body, shaft, and fluff lice, freed the fowls of these pests within 48 hours. They remained free from heavy reinfestation for 21 days, although allowed to mingle freely with heavily infested birds.

NOTE: The Grasselli Chemicals Department of the Du Pont Company, producers of both phenothiazine and sodium fluosilicate, will furnish qualified research workers with experimental quantities of both chemicals, upon request to the editor of the "Agricultural News Letter."

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Agricultural News Letter (Du Pont)
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THE AVAILABILITY OF NITROGEN AS AFFECTED BY CARBON-NITROGEN RATIOS IN ORGANIC FERTILIZER MATERIALS

Growing plants derive their food in part from products made available through the action of micro-organisms on organic material in the soil.

These soil micro-organisms need a balanced ration, as do higher forms of life.

The organic materials upon which they feed contain compounds of carbon, nitrogen, hydrogen, and oxygen. If this food contains more nitrogen in proportion to carbon than the organisms can use, nitrogen is made readily available for plants. Conversely, if the carbon is in great excess, the organisms themselves consume the nitrogen at the expense of the plants.

Ordinary wheat straw containing about 59% carbon and 0.3% nitrogen, and having a C:N ratio of 197:1, is of little value as a source of nitrogen for crop use. Peruvian guano, however, with a nitrogen content of 14% and a C:N ratio of approximately 1:1, yields its nitrogen up to plants very rapidly.

Ratios Used To Determine Relative Values of Fertilizer Materials

Accordingly, use has been made of the C:N ratios in manures and composts as a means of determining their relative values for fertilizing purposes. In applying this method to the evaluation of fertilizer materials, Edward J. Rubins and Firman E. Bear, in a project supported by the Ammonia Department of the Du Pont Company, found that, in most cases, if the C:N ratio was greater than 10:1, the rate of availability of the nitrogen was slow, whereas with C:N ratios less than 10:1, the material yielded its nitrogen up with increasing rapidity.

In their report on this subject in "Soil Science," Vol. 54, p. 411, December 1942, these workers found that it was necessary to apply a correction for that part of the carbon in the organic matter which is present in the form of lignin, such carbon being of little or no value as a food material to the soil micro-organisms. This helps to explain the relative availability of nitrogen in cottonseed meal and castor pomace. Cottonseed meal and castor pomace have C:N ratios of 5.40 and 9.36, respectively, suggesting a higher availability of nitrogen in cottonseed meal than in castor pomace. However, due to the fact that castor pomace contains 32% lignin as compared to only 5% in cottonseed meal, the availability of their nitrogen is practically equal.

NOTE: A reprint of the complete report by Rubins and Bear will be sent on request to the editor of the "Agricultural News Letter."

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UREA IMPROVES FOOD VALUE AND PALATABILITY OF SORGHUM SILAGE

More carotene, the precursor of vitamin A, was found in urea-treated sorghum silage than in silage not treated, and cattle showed a definite preference for the urea-treated material in experiments conducted by A. E. Cullison of the Mississippi Agricultural Experiment Station. The cows fed urea-treated silage maintained their weight through the 78-day wintering tests, while the cows fed untreated silage lost an average of 47 pounds during the period, and the difference in conditions was plainly evident at the end of the test.

To treat the silage, urea at the rate of 10 pounds per ton of material, was sprinkled on the freshly cut sweet sorghum as it entered the silo. Starting on December 16, the urea-treated silage was compared with untreated silage as a feed for wintering two uniform lots of 15 beef cows. One lot received 35 pounds of urea-treated silage per head, while the other received 35 pounds of untreated silage; and each lot received 5 pounds of Johnson grass hay per cow.

The following are extracts from Professor Cullison's report:

"It was also observed that the urea-treated silage was distinctly superior to the untreated silage in palatability. The lot of cows receiving the urea-treated silage consumed their regular allowance of this feed in approximately one-half the time required for the other lot to clean up their regular allowance of the untreated silage. When the hay was fed at the same time as the silage, the lot of cows receiving the urea-treated silage ate this feed in preference to the hay in the racks, whereas the other lot showed a distinct preference for hay and, for the most part, ate all of it before starting on the untreated silage."

Treatment Preserves Carotene

"The urea-treated silage after approximately four months' storage contained 34.55 gammas of carotene per gram of dry matter as compared to 22.67 gammas per gram for the untreated silage. Six weeks later an analysis of the two silages showed them to contain 35.96 and 15.71 gammas of carotene per gram of dry matter, respectively. This is an advantage for the urea-treated over the untreated silage in carotene content of 52.4 per cent for the earlier analysis and 128.9 per cent for the later analysis, with essentially no loss of carotene from the urea-treated silage during the period between the two analyses, whereas there was a considerable loss from the untreated silage during this period."

"The results of this first year's work indicate that there probably is a distinct benefit to be had from the treatment of sweet sorghum being used for silage with a small amount of urea at silo-filling time. Apparently the untreated sweet sorghum does not contain adequate available nitrogen for the proper development of a desirable bacterial flora in the silage material."

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CUTWORMS CAN BE KILLED WITH POISON BAIT

Cutworms, those destructive caterpillars that bury themselves during the day and "cut up" at night during warm weather, can be poisoned with chemicals.

Left unmolested, they do much damage to young shoots of vegetable and field crops. Heavy infestations of these insects often mow down a large proportion of cabbage, corn, tomatoes, and other growing young plants, at or near the ground, as fast as they come up, or after they are set out by the gardener.

While stiff paper collars extending from the roots to the first leaves around newly set plants offer an excellent method of control in small gardens, a poison-bran bait is more satisfactory for large areas, according to Du Pont entomologists.

Cutworms are plump, smooth-bodied, dull-colored, gray-to-brown caterpillars or "worms," about an inch and a half to two inches long when full-grown. They usually hide in the soil during the day within a few inches of their food plants. When disturbed, either in or above the ground, they usually coil up into a semi-circular crescent in an apparent attempt to protect themselves.

These pests can best be killed by a poison bait made by mixing thoroughly a quart of bran with a teaspoon of Paris green or sodium fluosilicate, and then adding about a pint of water sweetened with two tablespoons of syrup to make a moist but not sticky mixture.

Mixture Should Be Spread Near Plant In Evening

This mixture should be spread lightly around or near the plants in the evening shortly before the worms emerge to feed. Growers should not let the poison touch the plants as it will burn them. Since these baits contain chemicals that are poisonous to man and animals, they should be used with due caution, and should be stored out of reach of children, poultry, and domestic animals.

Gardeners may have difficulty in obtaining the recommended poisons. Thousands of pounds of sodium fluosilicate, for instance, are being bought and allocated by the government for use against expected grasshopper infestations this year. It is understood, however, that some dealers still have limited supplies of the recommended chemicals on hand.

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AIRPLANE REDUCES TIME NEEDED TO BROADCAST FERTILIZER

As much commercial fertilizer, such as superphosphate applied at the rate of about 275 pounds per acre, can be broadcast in one seven-hour day by airplane as can be spread in a 55-hour work week by such ground-operated equipment as a lime spreader or endgate seeder.

The savings in time are even greater when the acre rate of application is smaller, since the number of time-consuming stops for reloading the plane are reduced, thus permitting it to remain in the air longer and to cover a larger area with each plane-load of fertilizer.

The use of airplanes for this purpose has been found to be a particularly effective and comparatively inexpensive way to save labor and machinery and to prevent injury to fields often caused by using ground-operated spreaders.

Planes have been used successfully for some years to dust cotton, citrus, and other large-acreage crops to control insect pests. To a lesser extent, they have been used to fertilize soils for crops requiring broadcast treatment rather than applications in the row. Just before the war, some range land in Florida was fertilized with "Uramon" fertilizer compound, released by a plane.

It now appears that large amounts of various kinds and grades of high-analysis, dry fertilizers, as well as increasing amounts of insecticides, may be spread from the air, once adequate numbers of planes and fliers are again available for normal peacetime commercial operations.

More widespread use of planes may come even before the end of the war, especially for applying insecticides, since labor shortage and the urgency of administering insecticides quickly to infested areas have caused several agricultural groups to petition the War Department to grant leaves of absence to airplane pilots, for insect control work, particularly during July and August.

Meantime, interest in the use of planes for spreading fertilizers seems to be growing. Reports indicate that, even this year, some material was put out by plane. For instance, two Arkansas farmers, Theodore Muller and Leon Garot, of DeWitt, who operate in the rich rice-growing section of Arkansas County, had 55,000 pounds of superphosphate applied to 205 acres of lespedeza at a cost of only $1 per acre for the service.

Eight thousand pounds of superphosphate were broadcast per hour. The entire job was completed in less than seven hours. Since these growers are able to apply only about 1,000 pounds per hour with the ordinary endgate seeder customarily used, it would have required 55 hours to spread the superphosphate by the old-fashioned method.

"By using airplanes, farmers can prevent the injury caused to the oat crop, interplanted with the lespedeza, that results when the endgate seeder is driven over the field," according to W. F. Wright, county agricultural agent, who cooperated in the project.

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SMEAR 62 SAVES ARIZONA CATTLE INDUSTRY

"There is nothing in history to equal the speed with which Smear 62 was accepted after it was proved and introduced by the U. S. Bureau of Entomology and Plant Quarantine. It just about saved the Arizona cattle industry in the warm wet spring of 1941, which was positively the worst screwworm season anybody ever saw in these parts."

So says an article in the April 10 issue of "Arizona Farmer." Smear 62 is the government's new formula which includes diphenylamine and benzol as the active ingredients for control and prevention of screwworms which attack Southern livestock, particularly in the Southwest.

With the extremely warm winter throughout the South, veterinarians and livestock men state that 1943 probably will be another bad screwworm year. They anticipate continuous trouble throughout the summer. Screwworms were noticed in the southern valleys of Arizona as early as February, prompting Dr. W. J. Pistor, Professor Veterinary Medicine at the University of Arizona, to predict a heavy infestation.

The Arizona farm publication, commenting on this outlook, said that "farmers and rangemen are all set for the pesky things."

"They have plenty of Smear 62," it said, "and there's no reason to expect any shortage of smear ingredients."

Also Acts As Healing Agent For Wounds

It is now common practice for ranchmen also to use Smear 62 as a healing agent for wounds, even in months when screwworms are not to be feared. Commenting on this growing practice, Dr. Pistor said:

"Smear 62 does have good healing properties because of the diphenylamine, but the benzol irritates a little. If the fly problem is not a factor, I suggest that stockmen use dusting powders or even well-slaked lime on wounds to help in healing. The factors to be considered in all wound healing are to clean the wound, give proper drainage, and then prevent infections from entering by use of a powder or ointment to protect the wound. One reason why Smear 62 heals is because it forms a seal over the wound and protects it. If wounds are in the legs or other parts of the body where constant movement irritates the wounds, I suggest an ointment to keep the edges pliable."

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PROPIONATES PROTECT BREAD AND BUTTER AGAINST TOO-RAPID MOLD DEVELOPMENT

Unnecessary and costly waste of tremendous quantities of bread and butter is being eliminated by hundreds of American butter makers and at least 2,000 bakers who are using a harmless mold inhibitor.

This is of great importance as a conservation measure, especially in these wartimes when perishable food is shipped farther and warehoused longer; and when housewives, as well as large institutions and organizations, purchase food less frequently, with resultant delay in use.

This year three billion loaves of bread -- enough, laid end to end, to reach around the world well over 20 times at the equator, will be protected against loss due to mold and "rope" by addition of "Mycoban" propionate salts. Only two or three ounces of this inhibitor used in the mix for each 150 pound-loaves are needed to delay, for several days, development of the offensive mold growth.

More of the mold-retarding propionates will be used this year than ever before to save butter from too-rapid spoilage, especially in warm, humid climates. It is estimated by Du Pont, manufacturer of the propionates, that the mold-free life of 85,000,000 pounds of butter, protected by impregnating wrappers and tub liners with the inhibitor, will be lengthened two to three times.

Conserves Large Amounts of Fats, Milk, Sugar, and Vitamins

Use of propionates insures conservation of large amounts of scarce fats, milk, sugar, and vitamins used in the manufacture of bread and of tons of the precious cream used to make butter, without in any way affecting the flavor, texture, or appearance, of either the bread or the butter.

Man simply adds propionates to bread and the wrappers of butter, just as nature includes them in certain other foods such as Swiss cheese and vinegar, which are naturally highly resistant to mold development.

Mold is caused by tiny spores of fungi, which are always present in the air. The best sanitary precautions, air-conditioning and ultra-violet-lamp treatment in modern bakeries cannot wholly eliminate mold which develops in bread after baking, and which, left unretarded, soon makes the bread unfit to eat.

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REPORTS ON EFFICIENCY OF HORMONE PRE-HARVEST FRUIT-DROP SPRAYS

"PARMONE" CONCENTRATED TO HELP CONSERVE WAR MATERIALS

By Dr. W. H. Tisdale, Director,
Pest Control Research Laboratory
E. I. du Pont de Nemours and Co. (Inc.)
Wilmington, Delaware

To help conserve much-needed war materials, "Parmone" Concentrated pre-harvest fruit-drop spray containing four times as much naphthalene acetic acid as is contained in regular "Parmone" will be marketed this year, in glass containers. "Parmone" Concentrated is used at the rate of 1/4 pint per 100 gallons of water as a spray to prevent pre-harvest drop of apples and pears. Regular "Parmone" is used at the rate of one pint per 100 gallons of water.

Experiments on apples in Ohio during the past two seasons have shown "Parmone" Concentrated to be fully equal to regular "Parmone" for the prevention of pre-harvest drop of apples.

Similar results were obtained in Delaware on three varieties of apples, as is shown by the following table:

Product	Jonathan Percent Drop Av.	Jonathan Percent Drop Range	Delicious Percent Drop Av.	Delicious Percent Drop Range	Stayman Percent Drop Av.	Stayman Percent Drop Range
"Parmone" Regular	12.6	8.7-18.3	2.2	1-2.9	25.0	21.3-32.1
"Parmone" Concentrated	8.0	3.5-16.6	2.8	1.7-3.7	19.5	16.7-21.2
Checks (No "Parmone")	22.4	13.4-32.4	9.26	6.5-12.2	57.6	45.7-73.9

These records represent 12 replications of regular "Parmone" and "Parmone" Concentrated on three varieties. The data were analyzed by the method of covariance. This showed that at the minimum low odds of 20:1 the difference in performance is significant and in favor of the "Parmone" Concentrated, although at odds of 100:1 it is not significant.

It is safe to conclude, however, that "Parmone" Concentrated is fully equal to regular "Parmone", and that the reduction in the amount of solvent used has no adverse effect.

We shall be glad to cooperate by supplying samples of "Parmone" Concentrated to investigators who may wish to give it a trial. "Parmone" also is being prepared in experimental lots in powdered form for dusting.

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MIDDAY APPLICATION MORE EFFECTIVE THAN IN EARLY MORNING

Pre-harvest sprays containing naphthalene acetic acid, used on Williams, Delicious, and Stayman Winesap apple trees, were more effective when applied at certain concentrations at midday than in early morning when it was cooler, in experiments reported by Dr. L. P. Batjer, Pomologist, U. S. Bureau of Plant Industry, Beltsville, Md.

In these tests, the naphthalene acetic acid, which is the basic chemical in "Parmone" pre-harvest fruit-drop spray, was applied at different times of the day at different temperatures.

With Williams, a variety which has been found to be extremely responsive to hormone sprays, temperature differences were observed only when the concentration was below 5 parts per million.

With Delicious and Stayman Winesap, both 2.5 and 5 parts per million sprays were generally more effective when applied at the higher temperatures.

Dr. Batjer says that early-morning sprays required nearly an hour to dry compared with a half hour at noon, but that apparently absorption was much more rapid at the higher temperatures. He also reports that the effect of temperature on the persistence of sprayed leaf petioles suggested that approximately 75 degrees F. may represent the critical point above which temperature may not be an important factor.

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PRE-HARVEST DROP OF BARTLETT PEARS GREATLY REDUCED

Pre-harvest hormone sprays greatly reduced the drop of Bartlett pears in experiments conducted during two different years in California.

These tests, reported by A. E. Davey and C. O. Hesse, of the California Experiment Station and the U. S. Department of Agriculture, developed the fact that an average of more than three or four days was necessary for the influence of the sprays to manifest itself. The drop after treatment with chemicals at the strengths of 10 and 5 parts per million was reduced to about half of that on untreated trees.

In one instance, where naphthalene acetic acid, the basic chemical in "Parmone" pre-harvest fruit-drop spray, was used, the drop was only about one-third as great as it was from the untreated pear trees.

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HORMONE SPRAYS HELP MAKE 1942 BARTLETT PEAR CROP LARGEST EVER

Liberal use of hormone sprays by practically all growers of Bartlett pears in Lake County, California, to retard drop of fruits, is given by R. O. Brandt, Agricultural Commissioner, as the principal reason why the 1942 crop was the largest ever harvested in that area. The average price of both shipping and canning pears was more than $70 a ton, but costs were about 40 per cent higher than in the previous year, Mr. Brandt states. Much of the labor was done by local business and professional men and women.

Agricultural News Letter (Du Pont)
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DU PONT WEED KILLER AGAIN AVAILABLE

War Production Board in Order M-242, dated May 7, 1943, releases quantities of ammonium sulfamate for weed-killing purposes. Du Pont Weed Killer, the basic ingredient of which is ammonium sulfamate, is therefore again being made available.

The WPB order stipulates that consumers need only sign a form, which their suppliers will furnish, stating that they are using the product for weed-control purposes, when they purchase quantities in excess of 100 pounds per month.

AMMONIUM SULFAMATE KILLS POISON IVY ANY TIME DURING GROWING PERIOD OF PLANT

Ammonium sulfamate, applied from solutions of proper concentrations, will kill all poison ivy plants to which it is applied any time during their active growing period, according to experiments conducted by the New Hampshire Agricultural Experiment Station, Durham.

The tests also show that other plants sprayed with ammonium sulfamate lose their leaves and die, but grasses recover to some extent. Young oak, wild cherry, sumac, and barberry plants are killed when their leaves are covered with this new chemical compound; but if only the stems and trunks are sprayed, no apparent damage results.

Eradicates Ivy Growing on Apple Trees Without Harming Trees

Applied to poison ivy growing on apple trees, ammonium sulfamate eradicates the ivy without damage to the trees if the apple leaves are not sprayed, according to A. F. Yeager and C. Lyman Calahan, in a paper designated as "Scientific Contribution No. 4 of the Biological Institute of the University of New Hampshire," reprinted from the 1942 "Proceedings of the American Society of Horticultural Science."

This report discusses the results of two years' tests comparing sodium chlorate with ammonium sulfamate, which is not to be confused with ammonium sulfate. They quote the findings of Martin E. and Harold Cupery of the Du Pont Company, who reported in March, 1940, that ordinary poison ivy was particularly sensitive to ammonium sulfamate spray treatments, and that no appreciable new growth appeared after this material was applied.

Yeager and Calahan's report continues:

"Small quantities of ammonium sulfamate were furnished by the Grasselli Department of the E. I. Du Pont de Nemours & Company and trials were started

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at the New Hampshire Agricultural Experiment Station in July 1940, to determine its effects in poison ivy control. Plots were selected along a stone wall on which vigorous ivy growth had reached a height of 4 or 5 feet. Individual plot borders were not established by measured area, but by the area within which 1- or 2-gallon applications of the spray material would fully cover the foliage. This was approximately 100 square feet per gallon. A commercial sodium chlorate compound was used for comparison. All materials were applied with a 3-gallon compressed air sprayer. In each treatment a surrounding area was left untreated for check purposes."

Objects of Experiments

"The objects of these tests were: (a) To test the herbicidal efficiency of ammonium sulfamate as a poison ivy (Rhus Toxicodendron L.) eradicant in comparison to sodium chlorate; (b) to determine the effect of the time of application at different periods during the growing season; and (c) to determine the effect of these chemical compounds on other vegetation covered in the process of spraying.

"Sodium chlorate compound was used according to the manufacturer's recommendations, namely at the rate of 1 1/2 pounds per gallon of spray. Ammonium sulfamate at a strength of 3/8 pound per gallon was found to be relatively ineffective, hence in most of the trials ammonium sulfamate was increased to a strength of 3/4 pound per gallon of solution. Table 1 shows the effects secured from these two materials when applied at various times throughout the year."

TABLE I -- Efficiency of Ammonium Sulfamate and Sodium Chlorate Compound As Shown in Per Cent Kill for Different Periods of Application Taken at the Close of the Next Growing Season

Material Used	Concentration	Per Cent Killing When Applied On				
		Jul. 6	Aug. 5	Aug. 26	Sep. 18	Oct. 5
Ammonium sulfamate	3/4 pound to 1 gallon water	96.3	98.2	99.9	93.7	60.9
Sodium chlorate	1 1/2 pounds to 1 gallon water	29.9*	0	----	0	4.7

*Sprayed again September 17.

Ammonium Sulfamate Compared With Sodium Chlorate

"The immediate effect of sodium chlorate solution was to kill the poison ivy leaves. The ammonium sulfamate did not immediately affect the plant, but within 2 or 3 days the leaves began to turn brown and finally dried up. Since the readings, as indicated in the table, were made a year from the time of the

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last applications, they indicate the final effect of the spray rather than the immediate one. It will be noted from the table that sodium chlorate even when applied twice, once in July and again in September as a follow-up spray, gave a very poor kill. On the other hand ammonium sulfamate applied any time from July 6 up until September 18, while the plants were still actively growing, resulted in complete kill of the plants. These counts were made on the basis of the number of green leaves which developed after the treatment. The October 5 spraying was so late in the year that many of the leaves were yellow and some had dropped from the plants, yet it gave a fairly high percentage of kill.

"These treatments were continued during the early part of 1941, the first applications being made May 20 and others made at intervals thereafter. Even the May application apparently resulted in an almost perfect kill. During the 1940 season at Durham, rainfall was well distributed with a heavy dew occurring almost every night. In 1941 the season was very dry with less than half the normal rainfall. From all appearances applications were equally effective both years. Plants other than poison ivy, covered with the ammonium sulfamate spray, lost their leaves, but grasses recovered to some extent. The grass did not recover from chlorate. Young oak, wild cherry, sumac, and barberry plants growing among the poison ivy were killed when their leaves were covered with the ammonium sulfamate, yet if only the stems and trunks were sprayed no apparent damage resulted.

"Since the woody stems of these other plants did not appear to be damaged, poison ivy was sprayed beneath and on the trunks of a few apple trees in 1940, resulting in the destruction of the poison ivy without apparent damage to the trees. In 1941 a larger number of trees were selected and treated in the same way, with practically complete control of the poison ivy and no apparent damage to the apple trunk. In a few cases where water sprout and sucker growth of apple were present and the leaves were sprayed, this sprout growth was killed. Upon examination it was found that there was a small brown area about 3/4 inch in diameter in the bark and wood of the tree at the point where the sprout attached to the trunk. Care should be taken, therefore, in applying this material to apple trees that no apple leaves become covered and that water sprouts mingled with the poison ivy be removed before spraying."

Conclusions

"Two years' trials indicate the following: Ammonium sulfamate when applied in concentrations of 3/4 pound per gallon of water is an effective killing agent for poison ivy. The applications may be made any time during the active growth period of the plant. The soil is not so severely sterilized as when sodium chlorate is used, and grass may recover. Applications to poison ivy on apple tree trunks will eradicate the ivy and not damage the trees if apple leaves are not sprayed."

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SCIENCE FOLLOWS THE STARS AND STRIPES

ENOUGH PHENOTHIAZINE SENT TO NORTH AFRICA TO TREAT TWO MILLION SHEEP

When representatives of the Lend-Lease Administration discovered that 2,000,000 sheep in North Africa were heavily infested with such pests as stomach, nodular, and other destructive worms, they asked the U. S. Department of Agriculture what drug to use to control them.

Dr. Benjamin Schwartz, parasitologist of the Bureau of Animal Industry, with ample records, made a diagnosis and replied within three hours. His answer, based on several years of experimentation throughout the country, was that phenothiazine was the most effective chemical compound known for the destruction of practically all gastrointestinal roundworms.

Soon thereafter, adequate supplies were on the way to a destination "somewhere in North Africa," to help make the sheep more useful for the allied armies and the civilian population there.

This was made possible because normal peacetime investigation, followed by more recent accelerated wartime research, has developed this chemical control for internal parasites in sheep and other livestock. According to Du Pont chemists, phenothiazine is serving the same purpose throughout the livestock areas of the United States. It can be administered orally as a drench, in powder mixed with salt or in the feed, or as pellets.

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BODY DUSTING POWDER DERIVED IN PART FROM FARM CROP PROTECTS TROOPS

Millions of two-ounce cans of body dusting powder for the U. S. Army - already in the packs of North African troops -- will protect overseas personnel against typhus-carrying pests.

Although the powder contains some pyrethrum, an increasingly scarce standard ingredient of insecticides, substantial quantities are being saved by use of a Du Pont developed synthetic derived from the oil of a farm-grown crop -- the castor bean.

Laboratory tests have proved that this replacement compound -- known as isobutyl undecylenamide or the more pronounceable designation of IN-930 -- increases the efficiency of the pyrethrum in the powder. It has been used for several years as a supplement to pyrethrum in house and dairy fly sprays.

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"PHENOTHIAZINE IS AMMUNITION"

"The supply of phenothiazine is not abundant, but every effort is being made to assure that it will be ample. We are informed that Axis governments cannot supply this drug to their stockmen. This comes about from the fact that the chemical from which phenothiazine is made, diphenylamine, is employed in the manufacture of nearly all explosives, war gases, and rubber. Therefore, phenothiazine is ammunition and, like ammunition, it should be used not too sparingly, but wisely and effectively."
-- Bureau of Animal Industry, U. S. Dept. of Agriculture.

MIXING PHENOTHIAZINE WITH SALT IS SIMPLE WAY TO CONTROL ROUNDWORMS IN SHEEP

Capitalizing on the established practice of making granular salt available for volunteer consumption, science has found a simple and efficient way to get sheep to take their worm medicine without force.

Recent research at the U. S. Dept. of Agriculture Research Center at Beltsville, Md., and elsewhere, has shown that sheep will consume sufficient quantities of a suitable mixture of phenothiazine and granular salt to give effective control of important gastrointestinal roundworms -- nodular worms, stomach worms, and trichostrongyles.

This method eliminates tedious periodic treatments and the need for dosing and handling the sheep individually, thereby saving much time and labor. It also achieves a uniform control of parasitic infection. This is of special wartime importance because transportation difficulties have caused the United States and its Allies to rely largely on American sheep for lamb and mutton, as well as for wool, pelts, and material for absorbable surgical sutures and for sausage casings.

A. O. Foster, R. T. Habermann, and D. A. Shorb, of the U. S. Bureau of Animal Industry, in a statement on "Some Wartime Measures for Increasing Sheep Production Through Control of Internal Parasites," say that in the tests, the phenothiazine-salt mixture caused no injurious effects upon the sheep. Fertility and reproductivity were unimparied, the meat was unaffected, and the fleeces of the treated sheep, although slightly tinged with the brownish dye that is formed of the drug, were not damaged. In fact, lambs given this medication, compared to untreated animals, gained weight more rapidly and produced fleeces of equal or better quality.

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While death losses caused by parasitic worms are more apparent, they are actually less important than the stunted size and poor fleeces of lambs and sheep that survive in spite of infestations. The Bureau estimates that nodular disease, caused by nodular worms, alone accounts for a loss of about 100,000,000 pounds of lamb in this country annually, while at least $6,000,000 a year is lost because of discarded parasitized intestines.

Stomach worms cause losses of several million dollars a year, largely among lambs. They often acquire massive infestations so rapidly that they die of anemia before they have lost appreciably in weight or general condition. The chronic stomach worms cause considerable weight loss and poor fleece, especially in yearlings and mature sheep.

About 9% of some 16,000 spring lambs, suffering from trichostrongylosis or "black scours", died recently in a limited area in two midwestern states. Being in poor condition, and also infested with other parasites, 30 to 40 per cent of the survivors in some lots were condemned at the packing houses because of dehydration, anemia, and associated ills of parasitic origin.

These parasites can be controlled by good pasture hygiene and general sanitation, plus appropriate medication with phenothiazine, which is characterized by the federal scientists as "the most useful drug for preventing and arresting parasitism in sheep." Pointing out that sheep are particularly good subjects for treatment, they state that phenothiazine may also be administered in tablets, boluses, capsules, in feed, and as a drench.

To date, no tests have been made with molded salt licks containing the drug, but such medicated blocks would probably be satisfactory, and perhaps more convenient than the loose mixture, according to the Beltsville authorities.

After discussing in considerable detail alternative programs of medication which have been tested and found to be safe and efficacious, they suggest a combination of these "maintenance" programs as a first-year procedure, designed for sheep raisers who desire to achieve maximum results as soon as possible. The following are extracts from their recommendations:

Program A. Winter Medication with Standard Doses of Phenothiazine

"Two treatments of the breeding flock, one shortly before lambing and the other just before grazing begins in the spring, are an effective means of keeping sheep parasites in check. If there is uncertainty of the safety in handling ewes in advanced pregnancy, the first winter treatment may be given late in the fall or early in the winter, soon after the close of the grazing season. The dose of phenothiazine for adult sheep is 25 grams or approximately one ounce. So far as is known, phenothiazine is not injurious to pregnant ewes, but it is recommended that the drug be administered to them in the feed. The method requires only the thorough mixing of the drug (25 grams for each animal) with moistened grain and about 1 pound of this mixture fed to each animal. The animals can be treated in groups of about 8 or 10 ewes at one trough.

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"Winter medication is particularly suitable in northern sheep-raising areas where successive grazing seasons are separated by a relatively long season of cold or freezing weather. In these areas, the infections are carried over between seasons in the breeding stock, since pasture contamination drops to insignificant levels during the long, cold winters. Therefore, in spite of the fact that parasitism of sheep shows its worst effects upon the animals from midsummer through early fall, action must be taken during the preceding winter in order to prevent or minimize the contamination of spring pastures. This program is particularly applicable to the control of nodular worm disease."

Program B. Administering Phenothiazine in Salt

Dosage -- "The mixture that has proved most satisfactory consists of 1 part, by weight, of powdered phenothiazine and 9 parts of loose granular salt. There is evidence, however, from the limited information at hand that strict adherence to this formula is not essential; that mixtures containing from 9 to 14 parts of salt give good results.

"At first the sheep may not consume the mixtures readily. This is usually the case when the sheep are unfamiliar with the locations of the salt and are apprehensive of its phenothiazine content. To overcome this it may be necessary to add to the mixture, from time to time, a few handfuls of grain or other feeds to which the animals are accustomed. If the sheep continue to ignore the medication, probably too much phenothiazine is being used. Sheep will not consume sufficient amounts of a salt mixture containing more than 10 per cent of phenothiazine. On the other hand, if the animals appear to consume sufficient amounts to satisfy their usual requirements for salt, yet continue to suffer from parasitism, it is likely that the amount of drug is too small. Mixtures containing more than 14 or 15 parts of salt to 1 part of phenothiazine do not give effective control of internal parasites."

Effect of This Kind of Medication Upon Internal Parasites Is Two-fold. -- "First, the rate of pasture contamination drops to insignificance soon after the animals start consuming the drug. The eggs of the gastrointestinal roundworms which are passed in the feces of medicated sheep do not develop to free-living, infective stages in the pasture. Hence, the risk of reinfection is minimized, as are the dangers of permanent pastures. Second, the number of internal parasites, as judged by the number of eggs found in the feces and by the number of worms recovered at post-mortem examinations, is reduced markedly after 3 or 4 weeks of medication. Moreover, because the voluntary salt consumption of sheep is greater during the warm months, it follows that there is an increased intake of the drug during precisely those periods when the risks from parasitism are greatest.

"It is believed that this kind of medication should serve admirably the needs of sheep raisers in the warmer Southern states where sheep graze most of the year and where parasitism is an ever-present problem. In the Northern states where the long, hard winters afford considerable natural protection against parasitism, control with phenothiazine and salt is admirably adapted

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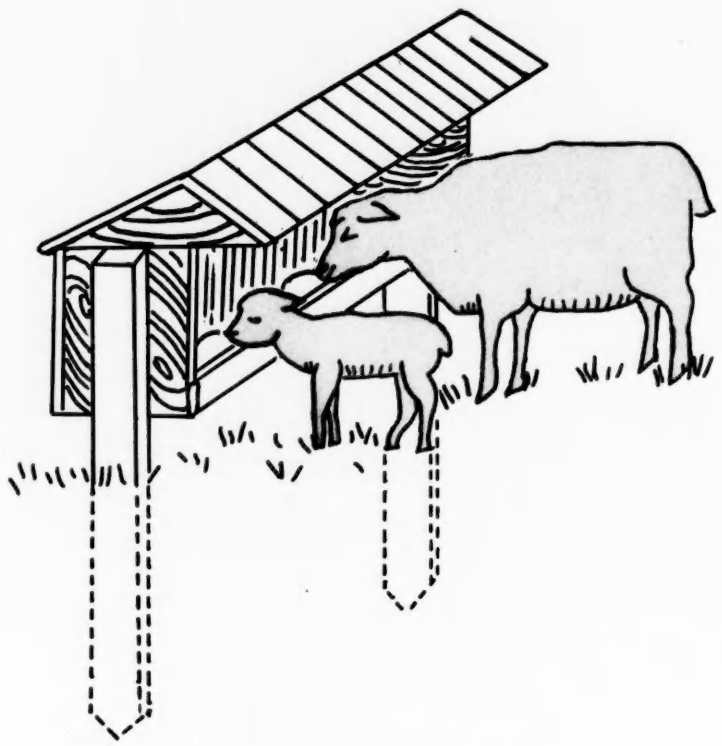

A suggested type of shelter for phenothiazine and salt mixtures

The mixture should be put in an open container that is sheltered from the weather, and where the sheep have ready access to it. A convenient method is to use small improvised shelters (see figure) that can be placed in several different parts of a pasture. The medicated salt may be placed in the box-like trough, which forms the floor of the shelter, if the boards are tight. Ordinarily, there should probably be one container of medicated salt for every 30 or 35 mature sheep. Sufficient quantities of the mixture (about 10 pounds) are put into the containers to meet the normal salt requirements of the flock for periods of 2 to 4 weeks, and the supply is replenished at more or less regular intervals.

to use during the grazing season. In these areas, this program of medication, namely, phenothiazine and salt during the grazing season, is all that should be required as a program to keep gastrointestinal parasitism in check."

Suggested First-year Procedure

"To minimize pasture contamination in the spring, all sheep except lambs, in northern sheep-raising areas should be given a therapeutic dose (25 grams or 1 ounce) of phenothiazine before they are put on spring pastures. Thereafter, the entire flock should receive the mixture of 1 part phenothiazine to 9 of salt. Good results could also be obtained by dosing at intervals of 3 to 4 weeks with the standard copper sulfate drench. Then, as a safeguard against 'black scours' (trichostrongylosis), all animals in the flock should be treated again in the fall or early winter with 1 ounce of phenothiazine each. This treatment should be repeated in late winter or early spring, before the breeder flock and its lambs are put on pasture. From this time on, it should be sufficient to follow the procedure outlined in either Program A or Program B, according to whichever seems best suited to the requirements and circumstances of the individual flock.

"In the southern sheep-raising areas, it is probably advisable as a first-year procedure to administer therapeutic doses of phenothiazine (1 ounce to adult sheep, 1/2 ounce to lambs) to all animals of the breeder flock and to all lambs over 3 months of age before initiating a program of medication with phenothiazine and salt. Thereafter, the flock could be kept on Program B. Where stomach worms are the chief offenders, periodic drenching with copper sulfate solution is a reliable alternative procedure. In order to minimize the amount of stain in the fleece, medication with phenothiazine and salt could, if desired, be discontinued about 6 weeks before shearing. At this time, therapeutic doses of the drug (25 grams) would be very helpful in protecting against severe parasitism in animals that are on contaminated pastures."

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NEW DU PONT BOOKLET "THE STORY OF PHENOTHIAZINE" NOW AVAILABLE

A new booklet, "The Story of Phenothiazine," containing recommendations for the use of this new vermifuge in the control of internal parasites of sheep, goats, hogs, horses, mules, cattle, and poultry, is now available.

Describing the research behind this sensational new drug, the booklet says:

"Only a few years ago it was being tried out as a plant insecticide. The scientists made the discovery that phenothiazine, while deadly to certain insects, was relatively nontoxic to animals. Further experiments in the Bureau of Animal Industry led to the development of phenothiazine as an anthelmintic to remove several species of gastrointestinal worms."

The booklet is intended as a general guide for the treatment of livestock with this new chemical product. It says all suggested dosages are based on information developed by the U. S. Department of Agriculture, State agricultural experiment stations, and manufacturers of stock remedies and veterinary supplies. It should be administered under the directions of a veterinarian or in accordance with directions issued by manufacturers of propietary products containing phenothiazine.

Phenothiazine May Be Administered By Several Methods

"Special caution should be observed in the treatment of weak or sick animals," the booklet says. "Phenothiazine may be administered by several methods which vary in preference in different sections of the country. It is available through suppliers in the form of pellets, drench and powder. Pellets are generally administered with forceps; drench with a syringe; powder with dry feed. The application of phenothiazine with feed has been found a time-saving method for treating poultry or animals, such as cattle and hogs, which may be difficult to handle. When feed mixtures are used, animals varying greatly in size should not be treated in one group and the medicated feed should not be offered to the animals until they are sufficiently hungry to eat at once. Care should be taken that each animal gets his share of the feed so that the dosage does not vary too greatly. It should be realized, of course, that feed dosages are less accurate than individual treatments with pellets or drench.

"Experimental work is now being conducted with mixtures of phenothiazine and salt for mass treatment. This method has already shown promising results in tests made with sheep on pasture."

Copy of this booklet will be sent upon request to the Editor of the "Agricultural News Letter," Du Pont Company, Wilmington, Delaware.

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AMMONIATING SOLUTIONS BEING DELIVERED TO FERTILIZER PLANTS FOR SUMMER USE

The considerable quantities of synthetic ammoniating solutions are now going to the fertilizer industry make possible increased use of this important plant-food ingredient in commercial mixtures to be used during the 1943-44 season.

However, in order most efficiently to utilize and conserve the nitrogen in these solutions for use later this year or even next spring as fertilizer, the liquid materials, which are delivered in tank cars, must be used soon after receipt so that the cars can be emptied and released.

Large stock piles of superphosphate must therefore be ammoniated at once, regardless of atmospheric temperature. This now means ammoniating during the summer, at high temperatures, large amounts of fertilizers that may not be used for many months. Under such conditions, the likelihood of losing significant amounts of available phosphoric acid by reversion is increased.

Mechanical Coolers Help Reduce High Temperatures of Mixtures

To make possible the use of as much solution as possible at any time of the year, and particularly to offset the higher temperatures encountered during the warmer months, a number of companies have installed coolers for the processing of ammoniated fertilizer bases. Other firms are now being given government permission to add such machinery as a wartime contribution in the year-round manufacture of fertilizers for much-needed crops for both domestic and foreign consumption.

The Du Pont Ammonia Department, after several years of experimental work has developed a cooler, the plans of which are available upon request.

In conducting the research, Du Pont chemists and engineers found that in removing the heat by means of such a cooler, reversion of phosphoric acid is greatly reduced, more ammonia can be used, condition or "feel" of the goods is improved, caking in storage is reduced, and considerable labor is saved when digging down storage piles because of reduction in "pile set."

All of these advantages are of special importance in connection with the campaign of the government and of the fertilizer industry for use of the maximum possible amount of solutions in fertilizers throughout the year.

In this campaign, superphosphate manufacturers are being asked to urge small mixers to take ammoniated superphosphate and also to see that superphosphate is obtainable throughout the period when ammonia solutions are available. Dry mixers equipped to use solutions are being asked to take them promptly as they become available, and mixers who are not equipped to use solutions are being told they should buy ammoniated superphosphate rather than superphosphate as such.

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NEW DU PONT MOVIE TELLS ABOUT "DELSTEROL" "D"-ACTIVATED ANIMAL STEROL

A glimpse behind the scenes, showing the long years of research that finally ended in development of "Delsterol" "D"-activated animal sterol for poultry feeds is given in a new full-color sound moving picture, "A Better Way -- The Story of A Chemical Discovery."

The picture has particular wartime significance. With the government asking the nation's poultry raisers to produce eggs at a rate exceeding 57,000,000,000 this year, rapid growth, early maturity, and high egg production must be given more consideration than ever before. Vitamin D is one of the vital factors in achieving these objectives. It aids in the raising of healthy, normal chicks without rickets, and in insuring good egg production without loss of vigor or "laying life."

Requires Eighteen Minutes To Run

The new film, which requires 18 minutes to run, is the story of the discovery, development, and effectiveness of "Delsterol." Born in the laboratory, the result of 10 years of research, this uniform, dependable, and economic source of vitamin D, is depicted through many stages of production, as it is mixed into feed, and as it is tested on living chicks to make sure in advance that it has the required potency. The presentation emphasizes the fact that "Delsterol" is made entirely from domestic raw materials, and is always available.

The story begins in a college poultry class, where the professor is asked about shortages incident to the war. The professor takes the class back to an earlier day and tells them about two graduates of the same school, whose experience and progress are climaxed by a meeting at which some timely and worthwhile information on vitamin D and "D"-activated animal sterol is presented.

Information on how to obtain a 16 mm. print may be obtained by writing the editor of the "Agricultural News Letter," Du Pont Company, Wilmington, Delaware.

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